

**BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA**



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NOT CONSOLIDATED

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**COMMENTS OF ORMAT TECHNOLOGIES, INC. ON ADMINISTRATIVE LAW
JUDGES' RULING SEEKING INPUT ON RENEWABLE INTEGRATION COST
REPORT AND NEXT STEPS FOR DEVELOPMENT OF RENEWABLES
INTEGRATION COST ADDER**

_ /s/ JOSHUA A. NORDQUIST
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Dated: June 3, 2016

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In accordance with the Rules of Practice and procedure of the California Public Utilities Commission (Commission), Ormat Technology, Inc. ("Ormat") is pleased to provide these Comments in response to the Administrative Law Judge (ALJ) ruling of May 11, 2016, regarding the Renewable Integration Cost Adder (RICA) Report filed on April 4, 2016 by Southern California Edison (SCE) in R.16-02-007.

Ormat's primary point in these comments is that passage of SB 350, with its anticipated 50% renewable energy supply, sufficiently changes the game that the focus on the variable cost component in the RICA report may severely understate actual integration costs. Responses to the questions posed in the ALJ Ruling will reflect this concern.

1. Do you agree with the primary conclusion of SCE's report that the results of this study (calculations of variable integration costs), as calculated using the tools and methodology described in the report, are unreliable? Explain why or why not.

Ormat concurs with SCE that the tools and methodologies used do not provide reliable results. There is no reason to believe that SCE would reach such a conclusion without good reason. Ormat agrees with SCE's general conclusion that evaluating costs associated with renewable integration and system operations becomes more difficult at higher renewable penetration levels, because impacts of different factors can be difficult to disaggregate. For example, increased solar curtailment simultaneously results in lost renewable energy, depressed or negative energy values during the daylight hours, and possibly higher downward reserve costs during curtailment intervals, because some conventional generators may have to increase production to provide those reserves with a consequent impact on renewable curtailment and GHG emissions. Ormat is supportive of an integrated approach to modeling these factors, as long as it results in specific quantitative estimates for alternative resources.

- 2. Do you agree with SCE's conclusion of four major lessons learned from this study:**
 - a. The database should be designed for the purpose of the study;**
 - b. The methodology should be designed with the confines of the model in mind;**
 - c. Uncertainty in the modeling approach should be considered; and**
 - d. A better understanding of reserve requirements and their relationship with increasing renewable penetration is needed.**

Ormat agrees with SCE's conclusions overall and in particular with the need for a better understanding of reserve requirements with increasing renewable penetrations.

Ormat has no comment on question three through six.

- 7. Should the Commission continue development of methods to isolate variable integration costs? If yes, how?**

As discussed in more detail below, Ormat support a comprehensive assessment of renewable integration costs as opposed to isolating variable integration cost components.

- 8. Should the Commission discontinue efforts to isolate variable integration costs and instead holistically calculate renewables integration costs without separating the components (variable integration costs, curtailment, and fixed costs)? Why or why not? If the Commission seeks to calculate renewables integration costs holistically, how should such a holistic calculation be undertaken? Specify any models or methods that would be required.**

There are several factors that would support developing a more holistic approach to calculating renewable integration costs, particularly under the high levels of renewable resource penetration

required by SB 350. ELCC analysis has shown that at high penetration levels the resulting capacity value of incremental solar generation is significantly reduced. Thus, the resulting loss of resource adequacy capacity value would need to be accounted for. The high ramps associated with excessive reliance on solar PV in particular exacerbate the need for additional gas-fired peaking resources and/or costly storage capacity. The GHG emissions associated with gas-fired generation and the capital cost and incremental losses associated with these resources need to be considered. Finally, the cost of curtailing renewable resources during periods of excess generation would have to be included. An excellent resource that should be considered in this process is the *Low Carbon Grid Study: Analysis of a 50% Emission Reduction in California*, published by the National Renewable Energy Laboratory (NREL).¹

9. What future activities would you recommend the Commission undertake to further refine calculation of renewables integration costs according to the legislative requirements, considering that the result should also have a productive impact on both renewables and broader resource planning and procurement? How high a priority should it be for the Commission to undertake such activities, if any? Explain.

As California moves to ever increasing renewable resource penetration it is vital to accurately determine the true costs of the chosen resources. The combination of an increasing concentration of rooftop solar and large quantities of “low cost” utility-scale solar installations will exacerbate integration issues. All components of the overall cost of a given portfolio must be carefully considered, not just PPA energy prices. Ormat is frankly concerned that utilities could have incentives to purchase “cheap” solar that would require more and more distribution and transmission upgrades that just happen to provide additional ratebase and additional utility earnings. Taking a big picture look at the implications of ever increasing concentrations of intermittent resources will help the Commission determine what is truly a Least Cost Best Fit resource mix. This is a vital step to advance the concept of a “diverse renewable portfolio” beyond lip service.

10. Should the adopted interim values for the variable component of the renewables integration cost adder be retained for use in the RPS Calculator and least-cost best-

¹ Low Carbon Grid Study, by Brinkman, Jorgenson, Ehlen and Caldwell, Technical Report NREL/TP-6A20-64884. www.nrel.gov/publications.

fit evaluation in RPS procurement? If not, what should replace them?

Ormat, informed by the Low Carbon Grid Study and CEERT's *The Value of Salton Sea Geothermal Development in California's Carbon Constrained Future*,² believes that the trivial values for integration cost adders used in the RPS calculator and LCBF evaluation may severely understate the cost impact of a less and less diverse renewable portfolio. Initially, these other studies should be carefully considered in developing of both an interim and long-term integration cost assessment.

11. Should renewables integration cost adders be developed for geothermal and biomass resources to reflect costs to the system for the relative inflexibility of these resources? If yes, how should these adders be calculated? How should such a methodology recognize that any resources that are not infinitely flexible will likely have some "integration" costs?

The impact of greater reliance of baseload geothermal and biomass resources should definitely be considered. However, as various studies have shown,³ considering that for every 1 MW of geothermal or biomass capacity added, 4 MW of solar PV can be avoided. Furthermore, unlike the variable renewable generation from wind and solar, these baseload resources could be operated with more flexibility. Ormat notes that geothermal generation is currently being used in Hawaii⁴ to provide AGC, regulation, load following, energy imbalance, spinning reserve, non-spinning reserve, replacement or supplemental reserve, and a 2 MW per minute up or down ramp rate. Even to the extent that new "inflexible" baseload renewable generation is replacing other baseload generation, such as Diablo Canyon which is assume retired in most modeling studies, it would not add any incremental non-flexible generation to the grid. An integration cost study should indeed assess the impact of inflexible (if they are truly inflexible) baseload resources so that developers can determine the potential cost effectiveness of increasing their resource's flexibility.

12. Should the Commission modify its previous work to develop a renewable integration cost adder specifically targeted to inform RPS planning and procurement, and

² James Caldwell and Dr. Liz Anthony, Center for Energy Efficiency and Renewable Technologies, March 2016.

³ Presentations at March 16, 2016 RETI 2.0 Plenary Group Meeting.

http://www.energy.ca.gov/reti/reti2/documents/2016-03-16_workshop/2016-03-16_presentations.php

⁴ 38 MW Puna Geothermal Venture. Described in: Automatic Generation Control and Ancillary Services, Nordquist, et al, GRC Transactions, Vol. 37, 2013.

instead, inform RPS planning and procurement via a comprehensive integrated resources planning process (for example, an analysis that optimizes for reliability, low carbon emissions, and least cost across all resource types)? Why or why not?

The total cost of integrating variable renewable resources should indeed inform RPS planning and procurement in a comprehensive integrated process. The IRP is an Integrated Resource Planning process; continuing to silo renewable integration costs into a simplistic “cost adder” for contract assessment fails the integrated approach.

13. How should parties most effectively participate in any future development of integration cost analysis pursued by the Commission (e.g. small working groups, a series of workshops, collaborative effort by parties with modeling capabilities, etc.)?

The Commission should build on the good work done by NREL and CEERT in a collaborative workshop process that reasonably considers all the long-term implications of different procurement choices.

Conclusion

Ormat appreciates the opportunity to submit these Comments and looks forward to working with the Commission and parties on the further development of integration cost analysis and refinements of the RPS least-cost best-fit (LCBF) methodology.

Respectfully,

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Dated: June 3, 2016

VERIFICATION

I, Bob Sullivan, am the Executive Vice President of Sales, Marketing & Business Development for Ormat Nevada Inc. I am authorized to make this Verification on its behalf. I have read the foregoing **COMMENTS OF ORMAT NEVADA INC. IN RESPONSE TO THE May 11, 2016 ADMINISTRATIVE LAW JUDGE RULING**. I am informed and believe that the matters stated in the foregoing pleading are true.

I declare under penalty of perjury that the foregoing is true and correct.

Executed June 3, 2016 at Reno, Nevada

/s/ Bob Sullivan

Executive Vice President, Sales, Marketing & Business Development

Ormat Nevada Inc.